DOCUMENT RESUME

ED 261 671 IR 011 821

AUTHOR Atnip, Gilbert W.
TITLE Teaching Psychology Students Computer Applications.
PUB DATE May 85
NOTE 13p.; Paper presented at the Annual Meeting of the Midwestern Psychological Association (Chicago, IL, May 2-4, 1985).
PUB TYPE Reports - Descriptive (141) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Artificial Intelligence; *Computer Literacy; Computer Simulation; Course Content; Course Descriptions; Higher Education; *Microcomputers; Programing; *Psychology; Statistical Analysis; Student Attitudes; *Teaching Methods; Word Processing
IDENTIFIERS *Computer Uses in Education

ABSTRACT

This paper describes an undergraduate-level course designed to teach the applications of computers that are most relevant in the social sciences, especially psychology. After an introduction to the basic concepts and terminology of computing, separate units were devoted to word processing, data analysis, data acquisition, artificial intelligence, and simulation and modeling. Each unit began with a classroom discussion and demonstration of a relevant program. Students then completed an out-of-class assignment using the program. Each student also conducted an independent research project that incorporated the skills taught in the course. Both students and instructor evaluated the course very favorably, and it is recommended that other institutions consider establishing similar courses. (Author/JB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

ED261671

Teaching Psychology Students Computer Applications

Gilbert W. Atnip

Indiana University Southeast

Midwestern Psychological Association

Chicago, May, 1985

IR011821

BEST COPY

PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Gilbert W. Atnip

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC).

Teaching Psychology Students Computer Applications
Gilbert W. Atnip

Abstract

Developments in computer hardware have made computers more accessible, while developments in software have made it possible and even desirable for people with little or no knowledge of programming to use computers fruitfully in their work. This paper desribes an undergraduate-level course designed and conducted by the author to teach the applications of computers that are most relevant in the social sciences, especially psychology. After an introduction to the basic concepts and terminology of computing, separate units were devoted to word processing, data analysis, data acquisition, artificial intelligence, and simulation and modeling. Each unit began with a classroom discussion and demonstration of a relevant program. Students then completed an out-of-class assignment using the program. Each student also conducted an independent research project that incorporated the skills taught in the course. Both students and instructor evaluated the course very favorably, and it is recommended that other institutions consider establishing similar courses.

During the Spring Semester just past, I taught a course on the use of computers in the social sciences. The purpose of this paper is to describe the course and to discuss my own and my students' evaluation of it. I hope those who are thinking of teaching a similar course, or incorporating the material into an existing course, will benefit from my experience.

Background

First, let me explain that I am a psychologist, not a computer expert. My relationship with computers has, at best, a checkered past. I well remember the undergraduate programming course I took in 1968. We punched our programs on cards, the computer was accessible to mere students only at night, programs crashed as soon as they encountered any sort of error, and the diagnostic messages were cryptic, to put it mildly. Getting a program debugged and running was a truly formidable task. The experience convinced me that computers should be approached only through the intercession of professionals and then only with caution.

My next encounter came in graduate school, when calculating ANOVA's by hand finally became a burden from which I sought succor by turning to canned statistical packages. The task still required punching cards, submitting them to one of the machine's acolytes, and waiting, often for a long time, as Ohio State had only one computer center. Nevertheless, I had to admit, grudgingly, that the computer had its use, though it was hardly easy to use.

After I began my academic career, I continued to use statistical packages to analyze data. The task was now easier, because, as a faculty member, I could call on students and staff personnel to code and enter data, and even to run the analyses that I wanted. I found this arrangement quite staisfactory. The computer remained remote, and certainly my computer knowledge and skills had increased little. But others now did most of the scut work and I concentrated on gathering the data and interpreting the results.

The turning point in my relationship with computers came during the 1981-82 academic year, when I had a sabbatical leave. By coincidence, the "computer revolution" was just getting under way, and the popular media were filled with stories extolling the new technology. I decided to spend part of my sabbatical finding out what all the fuss was about. I learned to program in BASIC and discovered that programming had changed enormously for the better since 1968. I learned word-processing, an invention at least as marvelous as the canned statistical program. I explored the interactive computing capabilities of the much-heralded "user-friendly" programs. I studied the possibilities and problems entailed by computer control in the laboratory, although, lacking the funds, I could not put anything into practice. Finally, I got reacquainted with the field of artificial intelligence, with which I had had a brush in graduate school.

It would be wrong to say that as a result of all this activity, I was struck down one day on the road to the computer center, blinded by the light of the chip. But I did come to realize that computers had become much more accessible, that they could do many more things that were relevant to me, and that I could get them to do these much more easily than in the past, and with less intervention from the acolytes. In fact, computer usage (as opposed to computer science) was becoming a priesthood of all believers, with the intercession of the fully ordained being necessary only in times of crisis.

During the 1982-83 year one of my colleagues with whom I had been discussing my growing knowledge of, and enthusiasm for, computers, suggested that I ought to teach a course on the use of computers in psychology. Like any convert, I was eager to spread the good news. I applied for, and received, a grant from the Indiana University Office of Learning Resources, to pay half my salary while I developed the course during the summer of 1983, and I taught the course for the first time this past Spring Semester.

Course Structure

I spent the first two weeks of the 14-week course on an introduction to computers and computing. The major purpose was to give students the basic concepts and vocabulary they would need to read program documentation and interact with the initiated. The format was lecture and discussion, and assigned reading. We were fortunate to have the manuscript of Cozby's excellent book, Using Computers in the Social Sciences (1984, Mayfield), which the author graciously allowed us to duplicate and use in the course because it was not to be published until the middle of the semester. The last session of this part of the course was devoted to discussing and practicing the procedures of logging on and off the computer. I programmed a number-guessing game to give students practice in these procedures, as well as in using the keyboard and interacting with the machine.

The bulk of the course was organized into units, each of which dealt with a specific computer application. In putting the course together, I decided to orient it to computer use rather than to programming. There are now enough user-friendly programs available that a person with no knowledge of programming can use computers directly in a number of fruitful ways. Besides, students who want to learn to program can take courses from computer scientists. At the time I was developing this course, there was no formal instruction available for those who wanted to learn to use programs rather than to write them. It was this void which I aimed to fill.

All the application units of the course had essentially the same organization. Each began with a class meeting or two in which I discussed the application, and demonstrated the relevant program. Then the students received an assignment to use the program and were given time to complete it and turn it in. We did not have formal meetings during these periods; instead, I worked with individual students, either in my office or in the computer center, as needed.

The first unit covered word processing. The program we used was MUSE4 (Marc Software), implemented on a PRIME 550 computer. I gave the students several controversial statements (e.g., Behavioral differences between the sexes are mainly biological in origin) and had them write a 500-word essay on one of their choice, using the word processor. I edited their original essays for both content and style and returned them for revisions, which also had to be turned in. This procedure gave the students direct experience with the greatest benefit of word processing, the ease of making changes. All subsequent written assignments had to be done with the word processor, so they got the opportunity for further practice.

The next unit dealt with data anaylsis. We used the statistical package, MINITAB (U. of Pennsylvania), on the PRIME 550. I chose this package over the better-known SPSS and BMD packages for several reasons. It was available on the local computer, whereas the others were available only on remote computers of the I.U. Network. It is wholly interactive, whereas the others are partly batch. Finally, its command structure is not as elaborate as those of the other packages. All in all, it seemed to be the easiest package for the students to learn. Although it is not as powerful as SPSS or BMD, many of the concepts are the same, and there should be good positive transfer for those who later want or need to learn one of the other packages.

This unit required the most in-class discussion and demonstration and out-of-class individual assistance. The reason was the wide diversity in statistical knowledge among the students. The assignment for this unit involved a set of hypothetical SAT scores and GPA's for male and female students in three different majors (English, Business, and Science). I chose these variables because they paralleled those in an example used by Cozby (1984) in his discussion of MINITAB. I gave the students the raw data in a handout. They had to enter the data, create a worksheet, find descriptive statistics, create various tables and plots, perform correlations, and calculate _t_ tests, one-way and two-way ANOVA's.

The third unit covered data acquisition, the on-line use of computers in the laboratory. The discussion centered on the advantages and disadvantages of this application, and on some of the technical problems of interfacing computers with other lab instruments. For their assignment, the students had to gather both one and two-choice reaction time data, first using electromechanical equipment, then using a TRS-80 computer under the control of a program developed by Life Science Associates. This allowed the students to compare directly two ways of doing the same experiment, and to see that the basic result was the same for both of them (i.e., two-choice RT's are longer).

The fourth unit concerned artificial intelligence. The classroom discussion covered the major concepts and aspects of the field, in an introductory manner, of course. We also discussed some of the controversies in the area, especially those deriving from the work of Weizenbaum (1976). Appropriately enough, the assignment employed a version of Weizenbaum's ELIZA program, written in BASIC for the IBM PC microcomputer. I asked the students to imagine they were in a modified version of the Turing Test, not knowing whether they were communicating with a human or a computer program. They were to devise appropriate tests of the status of their "partner," carry them out, and draw and justify a conclusion: human or program? They wrote papers describing what they did, why, and their results.

In a final set of class discussions, we covered such topics as computer-assisted instruction, modeling, and simulations. There was no assignment to accompany these discussions, as appropriate software was not immediately available locally.

In addition to the assignments above, each student had to use the computer to conduct an independent research project. They could choose an experiment from among those for which we had software, or they could devise a survey instrument. The great majority, of course, elected the latter. Once I approved their projects, they had to obtain approval from the campus Institutional Review Board. Then they had to recruit subjects, gather data, enter them in the computer, analyze them,

and write a standard research report. In other words, they got a fairly realistic exposure to the research process and the role of computers in it.

Evaluation

At the end of the course, I asked the students to write anonymous course evaluations, using the word processor, in response to a set of open-ended questions. (e.g., Evaluate the course format; evaluate the unit on word processing). The students were quite positive toward the course. They liked its organization and its emphasis on application rather than lecture. They found the assignments reasonable and appropriate, although each had his or her favorite and least favorite unit. The units that drew the most praise were word processing and the individual project. Those which received the most criticism were data analysis and data acquisition. Even in those cases, most of the comments were along the lines of "I didn't care for it myself, but I can see it might be useful." The great majority reported they enjoyed the course, found the information very useful, valuable, and worthwhile, and would recommend the course to other students.

Besides the several individual criticisms of some of the units, there were other isolated negative comments. The only aspect of the course that drew criticism from more than one student was the reading material. Several commented that there should have been more readings, that went into greater detail. That is, they had no complaint with what they had, but felt there was not enough of it. It is quite possible that these comments came from students who had prior experience with computers and so found the Cozby (1984) book, which is written on the introductory level for the uninitiated, too superficial. In the future, I may put additional readings on reserve in the library for these more sophisticated students.

My own evaluation of the course is also quite positive, although I have some reservations. The format of the class allowed me to work more closely with individual students than I do in my other courses, which are primarily lecture-oriented. As a result, I could see first-hand that the students were learning.

Furthermore, as their comments during the course as well as on the formal evaluation revealed, they perceived that what they were learning was valuable and worthwhile. This kind of immediate, positive reinforcement is rare and potent stuff for a teacher.

Another positive aspect of the course was that I learned a lot. I had expected that to happen while I was developing the course. But it also continued while I was teaching the course. First, my students made many mistakes that I had never made, especially in the use of the word processing and statistical packages. As a result, we discovered some characteristics and features of these packages of which I was previously unaware. One of the salient aspects of using computers is that you cannot ignore your mistakes, and therefore you must learn from them. Second, several students had prior experience with computers and so knew things I did not know. They shared their knowledge with me and with their classmates. It was the closest I have come in my teaching career to the ideal of a class as a partnership in learning.

One of the major problems I encountered, which I had anticipated, was the diversity of backgrounds of the students. They ranged from completely naive to fairly knowledgeable about computers. However, even the knowledgeable ones had not had much experience with the types of applications we studied. In addition, because I did so much one-to-one teaching, I could adjust to the level of the student. A more difficult problem arose with regard to statistical background. The students who had not had a statistics course encountered real difficulties in the unit on statistical packages. Although I spent some time in class reviewing basic statistical concepts, I found I had to spend much more time out of class teaching these on an individual basis. The ideal solution, of course, would be to make a statistics class prerequisite to this one (one student suggested this on the evaluation). Unfortunately, this is probably not workable on a commuter campus where few students follow a linear path in the pursuit of a degree. Instead,

I will probably allow more time for coverage of basic concepts the next time I teach the class.

Another problem I encountered was in grading, and it was somewhat unexpected. It seemed appropriate to base students' grades on how effectively they used the computer. The problem arose in trying to separate that from the content of their work. It was especially acute in the word-processing unit and the individual project. When a student uses the word-processing program very skillfully to produce a paper which is rambling and illogical, assigning a grade becomes quite difficult for someone who is accustomed to giving the greatest weight to content. This experience brought home to me the truth of Weizenbaum's (1976) observation that commanding the power of a computer is quite separate from accomplishing anything worthwhile with it. I think I was able, sometimes with great effort, to assign grades on technique rather than content. In any event, I received no complaints about my grading, which was no doubt due to most of the grades being high.

The problem of separating technique and content in grading raised a deeper issue for me. Should a course such as this one stand on its own, or should instruction on the use of computers be incorporated into the content-oriented classes in the curriculum? For example, instruction in word processing would be valuable in any course which requires a paper. Certainly statistical packages would fit into a statistics or a research methods course. In fact, I have used a statistical package in teaching the research methods course for several years. Why not simply incorporate the other units into the methods class as well? After all, the use of computers is undeniably an important part of research in psychology.

There are two major reasons that weigh against this solution for me. The first is that students already have all they can handle in the research methods class. Learning the principles of research design and data analysis, conducting experiments, and learning to write research reports constitute quite enough cognitive load for one semester. To add the material I covered in the computer course would

require deleting existing material from the methods course, something I do not wish to do. A similar argument can be made against spending time to teach computer use in other content classes. If something new comes in, something old must go out.

The second argument I have in favor of keeping computer use as a separate course is that I want to offer it to students outside of psychology, who may not have the time or the inclination to take advanced psychology classes. In fact, the course title I used was "Computers in the Social Sciences," and I had sociology as well as psychology majors in the class. In the future, I hope to have political science and even history students as well.

In the long run, I am not sure what the future of courses like this is. If students begin arriving at our doors with a high level of computer sophistication, this course may no longer be needed. For the moment, I believe it fills a void in the curriculum, and offers students some knowledge and skills they will find valuable in whatever careers they pursue. I urge departments which do not offer such a course to consider doing so, and I hope this paper has been useful in suggesting how to get started.

GWA/vm
7/1/84

References

Cozby, P. Using computers in the social sciences. Palo Alto: Mayfield, 1984.

Weizenbaum, J. Computer power and human reason. From judgment to calculation. San Francisco: Freeman, 1976.